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NOTE

**CHRONIC CAROTID AND
JUGULAR CATHETERIZATION
IN RHESUS MONKEYS**

J. M. Fein

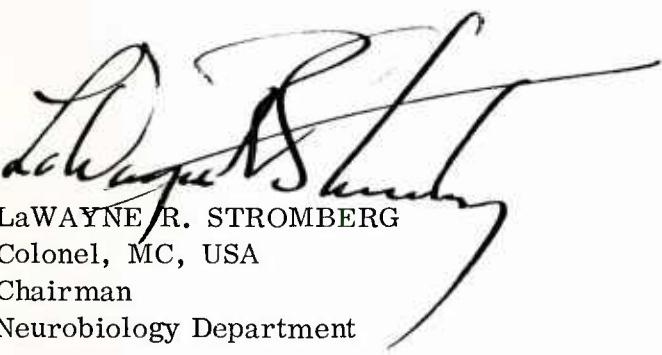
ARMED FORCES RADIobiology RESEARCH INSTITUTE
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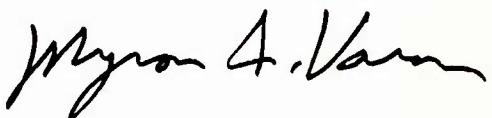
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CHRONIC CAROTID AND JUGULAR CATHETERIZATION
IN RHESUS MONKEYS

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ABSTRACT

A simplified technique of chronic catheterization of the common carotid artery and internal jugular vein is described. The advantages of the method are its simplicity and ease of access. The technique was used in studies involving angiography and cerebral blood flow, but can be adapted to various purposes.

I. INTRODUCTION

The common carotid artery and internal jugular vein are catheterized in experimental studies of cerebral blood flow and metabolism, in the course of cerebral angiography, and in the evaluation of drug effects on the nervous system. For acute studies investigators have employed repeated needle punctures, and percutaneous as well as open catheterization of these vessels. Repeated catheterization of vessels is limited by the hazards of thrombosis and embolism within the punctured vessel. To provide chronic access to larger vessels some investigators have devised relatively complex arterial loops^{1, 2} or have fashioned arterial catheters with an externalized portion secured to the skin for intermittent sampling or drug administration.^{3, 4} While these procedures may be suitable for more placid animals they are impractical in active experimental animals such as the rhesus monkey.

A technique was therefore devised for implanting catheters which would be suitable for use in long-term studies and which would allow sampling from, as well as injection into, the common carotid artery and internal jugular vein.

II. TECHNIQUE

Rhesus monkeys are tranquilized with intramuscular Sernylan for the initial implantation. Through a midline cervical incision the trachea is found and the strap muscles are split and retracted laterally. The carotid sheath is then dissected free with blunt instruments and the common carotid artery and

internal jugular vein are isolated and mobilized with umbilical tapes. After common carotid arteriotomy, a 22-gauge Longdwell catheter needle* is introduced into the carotid artery to the bifurcation. A Polaroid x-ray film is then taken to verify the position of the catheter since catheterization of the external carotid artery is undesirable and catheterization of the internal carotid artery will frequently result in vasospasm and occlusion. Improper positioning introduces unnecessary artifacts which can be avoided by proper placement of the catheter tip just proximal to the carotid bifurcation. Catheterization of the internal jugular vein is simpler, and the injection of 1 cc of Renografin can be used to verify the position of the catheter tip in the jugular bulb. When proper position of the catheter is confirmed, an obturator and its attached screw cap are securely closed over the catheter.

After implanting both the arterial and venous catheters they are secured to the midline strap muscles and subcutaneous tissues with a single #32-gauge wire suture, thereby also obliterating some of the residual dead space. The catheters are then coiled subcutaneously and the hubs are led out to lie below a separate lateral stab wound in the neck which is temporarily closed with a single Michel clip. The midline incision is then sutured with 4-0 black silk and routine wound care is sufficient for healing to occur.

* Longdwell catheter provided by Becton, Dickinson and Company, Rutherford, New Jersey

Whenever desired the monkeys are immobilized in squeeze cages.

Sampling of blood or injection of contrast, radioisotope or drugs is then easily accomplished by simply removing a single Michel clip.

III. COMMENT

For chronic studies of the cerebral circulation it is necessary to have a reliable means of intermittently withdrawing blood as well as injecting various agents into the carotid and jugular circulations. In active or aggressive animals this entails the risk of uncontrollable hemorrhage if a catheter becomes displaced.

In all instances using the present technique where the arterial catheter tip lodged in the common carotid bulb, the catheters remained patent for up to 15 days without requiring irrigation. We would caution against allowing the catheter tip to lie in the lumen of the internal carotid artery. In this position there probably is functional obstruction of blood flow by the catheter and a high rate of thrombus formation. No complications were observed related to the venous catheter, irrespective of the exact position of the catheter tip. Antibiotics were not used in this series of animals but are recommended for longer term studies.

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